

CLAIMS

1 1. A method of imaging a sample comprising:
generating an ultrasonic signal;
directing the ultrasonic signal into a sample;
receiving any signal reflected by said sample,
5 which signal is distorted and contains a first order
and higher order component signals at first and higher
frequencies respectively;

forming an image from one of said higher order
component signals of the received distorted signal;
10 and
displaying said formed image.

2. A method according to Claim 1, wherein the
forming step includes the step of removing from the
received distorted signal the first order component
15 thereof.

3. A method according to Claim 2, wherein the
removing step includes the step of high-pass filtering
the received, reflected distorted signal to remove
therefrom the first order component thereof.

20 4. A method according to Claim 2, wherein:
the generating signal includes the steps of
generating first and second ultrasonic signals;
the directing step includes the steps of
directing the first and second ultrasonic signals into
25 the sample;

the receiving step includes the step of receiving
any first and second signals reflected and distorted
by said sample;

the forming step includes the steps of
30 i) subtracting the received second distorted
signal from the received first distorted signal to

produce a resultant signal, and

1 ii) forming the image from said resultant signal.

5 5. A method according to Claim 4, wherein the first and second signals are identical except that one is scaled up in magnitude by a factor x (greater than 1) relative to the other and the second signal is transmitted after the reception of the distorted first signal.

10 6. A method according to Claim 5, wherein the sample (i) distorts the first ultrasonic signal to produce a first distorted signal, (ii) reflects the first distorted signal, (iii) distorts the second ultrasonic signal to produce a second distorted signal, and (iv) reflects the second distorted signal.

15 7. A method according to Claim 6, wherein the forming step includes the step of:

 scaling the smaller received distorted signal (corresponding to the unscaled transmitted signal) by the previously used scale factor x ;

20 next subtracting this scaled signal to produce a difference signal essentially without frequency content in the original transmitted bandwidth; and

 forming the image from one of said higher order component signals of the difference signal.

25 8. A method according to Claim 1, wherein said higher order component signals includes a second order component, and the forming step includes the step of forming the image from said second order component.

30 9. A method according to Claim 1, wherein the generating step includes the step of generating a series of ultrasonic pulse signals.

 10. A method according to Claim 1 wherein the

1 directing step includes the step of maintaining the
sample substantially free of any contrast agent not
naturally present in the sample.

11. A method according to Claim 1, wherein the
sample is a biological sample.

5 12. A system for imaging a sample comprising:
means for generating an ultrasonic signal;
means for directing the ultrasonic signal into a
sample;

10 means for receiving any signal reflected by said
sample, which signal is distorted and contains a first
order and higher order component signals at first and
higher frequencies respectively;

15 means for forming an image from one of said
higher order component signals of the received
distorted signal; and

means for displaying said formed image.

20 13. A system according to Claim 12, wherein the
means for forming the image includes means for
removing from the received distorted signal the first
order component thereof.

25 14. A system according to Claim 13, wherein the
means for removing the first order component from the
received distorted signal includes a high-pass filter
to filter the received, reflected distorted signal to
remove therefrom the first order component thereof.

15. A system according to Claim 13, wherein:
the means for generating the ultrasonic signal
includes means for generating first and second
ultrasonic signals;

30 the means for directing the ultrasonic signal
into the sample includes means for directing the first

and second ultrasonic signals into the sample;

1 the receiving means includes means for receiving
any first and second signals reflected and distorted
by said sample;

the means for forming the image includes

5 i) means for subtracting the received second
distorted signal from the received first distorted
signal to produce a resultant signal, and

ii) means for forming the image from said
resultant signal.

10 16. A system according to Claim 15, wherein the
first and second signals are identical except that one
is scaled up in magnitude by a factor x (greater than
1) relative to the other and the second signal is
transmitted after the reception of the distorted first
15 signal.

17. A system according to Claim 16, wherein the
sample (i) distorts the first ultrasonic signal to
produce a first distorted signal, (ii) reflects the
first distorted signal, (iii) distorts the second
20 ultrasonic signal to produce a second distorted
signal, and (iv) reflects the second distorted signal.

18. A system according to Claim 16, wherein the
forming means includes:

25 means for scaling the smaller received distorted
signal (corresponding to the unscaled transmitted
signal) by the previously used scale factor x ; and

next for subtracting this scaled signal to
produce a difference signal essentially without
frequency content in the original transmitted
30 bandwidth; and

means for forming the image from one of said

1 higher order component signals of the difference
signal.

5 19. A system according to Claim 12, wherein said
higher order component signals include a second order
component, and the means for forming the image
includes means for forming the image from said second
order component.

10 20. A system according to Claim 12, wherein the
means for generating the ultrasonic signal includes
means for generating a series of ultrasonic pulse
signals.

21. A system according to Claim 12, wherein the
sample is substantially free of any contrast agent not
naturally present in the sample.

15 22. A system according to Claim 12, wherein the
sample is a biological sample.

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